

WHAT IS CLAIMED:

1. A machine for carrying out machining operations on rectangular frameworks using at least one power tool, said machine comprising:
 - a machine base frame having a length and a width;
 - at least one framework guide supporting device mounted on said base frame;
 - two horizontally extending guide arrangements mounted one above the other on said at least one supporting device, said guide arrangements being adapted to guide and support respectively two of said rectangular frameworks for intermittent horizontal movement relative to said machine in the lengthwise direction of the base frame;
 - a tool supporting mechanism;
 - at least one power tool for carrying out machining operations on said frameworks; and
 - a transporting mechanism mounted on said tool supporting mechanism, supporting said at least one power tool, and capable of moving said at least one power tool both horizontally in said lengthwise direction of the base frame and vertically relative to said base frame;
 - wherein during use of said machine, said at least one power tool can carry out one or more machining operations on said two frameworks and said two frameworks are supported one above the other on said two guide arrangements.
2. A machine according to claim 1 wherein there are two of said at least one guide supporting device and each guide supporting device includes an elongate horizontal support frame mounted on said base frame and one of the horizontal support frames is mounted for horizontal sliding movement on said base frame in the widthwise direction of said base frame.
3. A machine according to claim 1 wherein said tool supporting mechanism includes a horizontal support beam mounted for horizontal sliding movement on said base frame in the widthwise direction of the base frame.

4. A machine according to claim 3 wherein said transporting mechanism includes a vertical support plate mounted for horizontal sliding movement on said support beam and a tool supporting carriage unit mounted for vertical sliding movement on said vertical support plate.
5. A machine according to claim 4 wherein said at least one power tool is a drill unit assembly including a drill bit holder and a motor for rotating a drill bit mounted in said drill bit holder, and wherein said carriage unit includes a support arm having said drill unit assembly mounted thereon and pivotable about a horizontal axis in order to change the drilling orientation of said drill unit assembly.
6. A machine according to claim 5 wherein said carriage unit includes an upright post rotatable about a vertical axis and a gear housing in which said post is rotatably mounted, said support arm being pivotably mounted at a top end of the upright post.
7. A machine according to claim 6 wherein one end of said gear housing is attached to a vertical mounting plate slidably mounted on said support plate, a vertical drive motor is mounted on said vertical mounting plate and is operatively connected to a spur gear for rotating same, and a vertically extending, toothed rack is mounted on said support plate for engagement with said spur gear in order to provide drive means for raising or lowering said carriage unit and the drill unit assembly.
8. A machine according to claim 2 including two parallel, horizontal tracks each of which is mounted on top of its respective guide supporting device and two clamping arm assemblies each mounted on a respective one of said tracks for horizontal movement along its track, each clamping arm assembly being adapted to clamp said two frameworks and to move said two frameworks along said guide arrangements during operation of said machine.
9. A machine according to claim 2 wherein each of said guide arrangements is a pair of substantially horizontal rails spaced horizontally

apart a selected distance corresponding closely to one dimension of the two frameworks and said machine further includes clamping devices for firmly and temporarily holding a respective one of said two frameworks arranged along each pair of the rails.

10. A machine according to claim 9 wherein said tool supporting mechanism includes a horizontal support beam mounted for horizontal sliding movement on said base frame in the widthwise direction of the base frame.

11. An apparatus for carrying out machining operations on a workpiece, said apparatus comprising:

a tool carriage mechanism adapted for mounting on a support member and movable with respect to said support member, said tool carriage mechanism including a base unit mountable on said support member, a support post having one end rotatably mounted on or in said base unit and a first drive motor unit capable of rotating said support post about a central longitudinal axis of said post;

a power tool for carrying out machining operations, said power tool including a second drive motor and a tool rotatable by said second drive motor;

a support arm pivotable about a transverse axis that is substantially perpendicular to said central longitudinal axis, said support arm being mounted on a second end of said support post which is opposite said one end and said power tool being mounted on a section of said support arm spaced away from the support post; and

a third drive motor unit capable of pivoting said support arm and the attached power tool about said transverse axis,

wherein said support arm and third drive motor unit can be used to change the operating orientation of said power tool during use of said apparatus.

12. An apparatus according to claim 11 wherein said tool carriage mechanism includes a vertical main mounting plate on which said base unit is movably mounted and a drive motor mechanism adapted for moving said

base unit vertically on said main mounting plate, said drive motor mechanism including a fourth drive motor mounted on said base unit.

13. An apparatus according to claim 11 wherein said central longitudinal axis of support post is a vertical axis, said support post comprises a substantially hollow tube, said first drive motor unit is mounted substantially in a lower section of the hollow tube, and said third drive motor unit is mounted substantially in an upper section of said hollow tube.

14. An apparatus according to claim 13 wherein said power tool is a drilling unit assembly including a drill bit holder and said support arm is pivotable through an angle of at least 180 degrees about said transverse axis.

15. An apparatus according to claim 13 wherein said base unit includes a gear housing having a longitudinal central axis, which extends horizontally, and a vertical mounting plate attached to an end of said gear housing and fitted with ball slides for facilitating vertical movement of the gear housing and the mounting plate, said one end of said support post extending into said gear housing and said first drive motor unit being operatively connected by a drive shaft attached to said gear housing.

16. An apparatus according to claim 15 wherein said tool carriage mechanism further includes a support beam adapted to extend horizontally along a longitudinal beam axis and to move horizontally in a direction perpendicular to said longitudinal beam axis, and a vertical main mounting plate mounted for horizontal movement on said support beam in a direction parallel to said longitudinal beam axis, said first mentioned mounting plate being movably mounted on said main mounting plate by means of said ball slides.

17. An apparatus according to claim 16 including a further drive motor mounted on said main mounting plate and adapted to rotate a further spur gear and a toothed rack mounted on and extending lengthwise along said support beam, said further spur gear engaging said rack so that a selected

amount of rotation of said further spur gear causes said main mounting plate to move horizontally along said support beam a desired distance during use of said apparatus.

18. An apparatus according to claim 11 wherein said third drive motor unit includes a servomotor mounted in said support post, a first bevel gear rotatable by said servomotor, and another bevel gear mounted on a horizontal shaft and driven by said first bevel gear, said support arm being fixedly connected to said horizontal shaft which extends along said transverse axis and is rotatably supported on top of said support post.

19. An apparatus for carrying out machining operations on plastic frameworks such as window frames, said apparatus comprising:

a power tool for carrying out machining operations on one of said plastic frameworks, said power tool including a first drive motor and a tool device operatively connected to and adapted to be driven by said first drive motor;

a lever member pivotable about a first horizontal pivot axis and supporting said power tool at a location spaced away from said pivot axis;

a vertically extending, first support structure on which said lever member is mounted for pivotable movement about said horizontal pivot axis;

a horizontally extending, second support structure on which said first support structure is mounted for rotation about a substantially vertical axis of rotation;

a third support structure on which said second support structure is movably mounted;

a second drive motor mounted on said first support structure and operatively connected to said lever member in order to pivot said lever member about said pivot axis; and

a drive motor system mounted on one of said first and second support structures and operatively connected to rotate said first support structure about said axis of rotation in a desired manner,

wherein the operating orientation of said tool device can be turned about said two axes during use of said apparatus.

20. An apparatus according to claim 19 wherein said third support structure includes a vertically extending main mounting plate on which said second support structure is vertically movable and said apparatus further includes a further drive motor system for moving said second support structure vertically on said main mounting plate, said further drive motor system including a further drive motor mounted on said second support structure.

21. An apparatus according to claim 19 wherein said tool device includes a rotatable drill bit holder and a drill bit mountable in said drill bit holder, said lever member is a lever arm, and said horizontal pivot axis is located at one end of said lever arm.

22. An apparatus according to claim 21 wherein said first support structure is a hollow, elongate post, said lever arm is pivotably mounted at a top end of said post, and said second drive motor is mounted within said post and has an output shaft connected to a bevel pinion rotatable about a vertical axis, said bevel pinion engaging a bevel gear mounted on a shaft for rotation about said pivot axis, said one end of lever arm being attached to said shaft.

23. An apparatus according to claim 19 wherein said first support structure is a hollow, elongate post, said lever member is pivotably mounted at a top end of said post, said second drive motor is mounted within an upper section of said post, and said drive motor system includes a servomotor mounted within a lower section of said post.

24. An apparatus according to claim 23 wherein said second support structure comprises a box-like housing having a vertical supporting plate at one end, said post extends upwardly from an opposite end section of the housing, and a bottom end section of said post is rotatably mounted in said housing.

25. An apparatus according to claim 24 wherein said third support structure is a vertical main mounting plate having vertical rails mounted thereon, ball slides are mounted on said supporting plate for sliding movement on said rails, and said apparatus includes an additional drive motor mounted on said supporting plate and operatively connected to a rack and pinion drive system in order to move said box-like housing and said post selectively upwardly or downwardly relative to said main mounting plate.

26. An apparatus according to claim 19 including a support beam adapted to extend horizontally during use of said apparatus, wherein said third support structure is slidably mounted on said support beam for movement along said beam in the lengthwise direction of the beam.

27. An apparatus according to claim 26 including a servomotor drive system for controllably moving said third support structure along said beam, said servomotor drive system including a servomotor mounted on said third support structure and a gear rotatable by said servomotor and engaging a rack mounted on said beam.

28. A method for processing plastic frameworks such as window frames, said method comprising:

welding elongate plastic frame members together in a plastic frame welding machine and thereby forming two rectangular plastic frameworks located one above the other;

moving said two plastic frameworks to a framework processing machine with one of said plastic frameworks being moved along a first predetermined path to said processing machine and the other of said frameworks being moved along a second predetermined path to said processing machine, said second path being located above said first path; and

carrying out processing steps on both of said plastic frameworks by means of said processing machine while said plastic frameworks are both positioned on said processing machine and one of the plastic frameworks is held higher than the other plastic framework, said processing steps being

carried out by at least one power tool having a drive motor and mounted on a lever member pivotable about a horizontal pivot axis and supporting said power tool at a location spaced away from said pivot axis, said lever member being mounted on a vertically extending support structure for pivotable movement about said horizontal pivot axis, said processing steps including manipulating the or each power tool to carry out one or more processing steps on at least one of said plastic framework by pivoting said lever member and said power tool about said horizontal pivot axis and rotating said support structure about a substantially vertical axis so that the power tool is properly positioned and oriented for said one or more processing steps.

29. A method for processing plastic frameworks according to claim 28 wherein said two plastic frameworks are moved by gripper arm assemblies along upper and lower pairs of rails to said framework processing machine.

30. A method for processing plastic frameworks according to claim 28 including the additional steps of moving said two plastic frameworks substantially horizontally to a separate framework cleaning machine after said processing steps have been carried out by said processing machine, and then carrying out plastic weld cleaning steps by means of said framework cleaning machine on the two plastic frameworks while they are both positioned simultaneously and one above the other on said framework cleaning machine, said processing steps carried out by said framework processing machine being machining steps other than weld cleaning.

31. A method for manufacturing plastic frameworks such as window frames, said method comprising:

welding elongate plastic frame members together in a plastic frame welding machine and thereby forming two rectangular plastic frameworks located one above the other;

moving said two plastic frameworks to a framework processing machine with one of said plastic frameworks being moved along a first predetermined path to said processing machine and the other of said

frameworks being moved along a second predetermined path to said processing machine, said second path being located above said first path;

carrying out machining operations on both of said plastic frameworks by means of one or more power tools mounted on said processing machine while said plastic frameworks are both positioned on said processing machine and one of the plastic frameworks is held higher than the other plastic framework;

moving the machined plastic frameworks to a weld cleaning machine with one of said plastic frameworks being moved along a lower path to said weld cleaning machine and the other of said frameworks being moved along an upper path located above said lower path to the weld cleaning machine; and

carrying out processing operations including weld cleaning steps on both of said machined plastic frameworks by means of said weld cleaning machine while one of the machined plastic frameworks is held higher than the other plastic framework.

32. A method for manufacturing plastic frameworks according to claim 31 wherein said first predetermined path is defined by a first guide arrangement mounted on said framework processing machine and extending substantially horizontally and said second predetermined path is defined by a second guide arrangement mounted on said framework processing machine and extending substantially horizontally.

33. A method for manufacturing plastic frameworks according to claim 32 wherein each guide arrangement comprises two spaced-apart supporting rails which are horizontally aligned and each of said plastic frameworks is moved along its respective supporting rails by means of at least one clamping arm assembly slidably mounted on a horizontal track arrangement.

34. A method for manufacturing plastic frameworks according to claim 31 wherein said lower path is defined by a lower guide arrangement mounted on said weld cleaning machine and extending substantially horizontally and said

upper path is defined by an upper guide arrangement mounted on said weld cleaning machine and extending substantially horizontally.

35. A method for manufacturing plastic frameworks according to claim 31 wherein said one or more power tools mounted on said processing machine include a power drill having a drill bit holder and an electric motor adapted to rotate said drill bit holder and a drill bit mounted therein, and said processing machine includes a transporting mechanism on which said power drill is mounted, said transporting mechanism being used to move said power drill horizontally, vertically or both horizontally and vertically in order to position said power drill prior to said power drill carrying out said machining operations.

36. A method of manufacturing plastic frameworks according to claim 35 wherein said transporting mechanism is used to position said power drill adjacent both left and right sides of said plastic frameworks and said machining operations are carried out by said power drill on both of said left and right sides of said plastic frameworks.

37. A method of manufacturing plastic frameworks according to claim 35 wherein said transporting mechanism includes a support arm on which said power drill is mounted, said support arm and the attached power drill being pivoted about a horizontal pivot axis in order to change the drilling orientation of said power drill prior to said power drill carrying out one or more of said machining operations.

38. A method of manufacturing plastic frameworks according to claim 32 wherein said one or more power tools mounted on said processing machine include a power drill having a drill bit holder and an electric motor adapted to rotate said drill bit holder and a drill bit mounted therein, and said processing machine including a transporting mechanism on which said power drill is mounted, said transporting mechanism being used to move said power drill horizontally, vertically or both horizontally and vertically in order to position

said power drill prior to said power drill carrying out said machining operations.